

**ALBERTA TRANSPORTATION AND
ECONOMIC CORRIDORS
GEOHAZARD ASSESSMENT PROGRAM
PEACE REGION – SWAN HILLS
2024 INSPECTION**



Site Number	Location	Name	Hwy	km
SH012-8 SH012-9	Little Smoky River	Little Smoky River Valley, North Hill – Sites #8 and #9	744:02	19.70-19.83 19.83-20.0*
Legal Description		UTM Co-ordinates		
Site 8: SW21-76-22-W5M		11U E 477,815	N	6,161,486
Site 9: 21-76-22-W5		11U E 477,887	N	6,161,592

	Date	PF	CF	Total
Previous Inspection:	31-May-2022	10	4	Site 8: 40
		11	4	Site 9: 44
Current Inspection:	4-Jun-2024	10	4	Site 8: 40
		11	4	Site 9: 44
Road AADT:	270		Year:	2024
Inspected By:	Rishi Adhikari, TEC Robert Senior, TEC	Ken Froese, Thurber Roger Skirrow, Thurber		
Report Attachments:	<input type="checkbox"/> Photographs <input checked="" type="checkbox"/> Plans <input type="checkbox"/> Maintenance Items			

Primary Site Issue:	Highway traverses deep-seated, retrogressive landslides with ongoing creep movements due partly to erosion at toe by the Little Smoky River and Peavine Creek resulting in cracking and sagging of the pavement surface at numerous locations. Approx. 4 km of the highway crosses this unstable north valley slope. Site #12-8 is 65 m above and 400 m away from the Peavine Creek and Site #12-9 is 65 m above and 435 m away.	
Dimensions:	Site 8: 130 m length of highway affected by cracking and distortion Site 9: 170 m length of highway affected by cracking and distortion Unchanged from 2022.	
Dates of Remediations:	<u>1988</u> : 6 m deep subdrain installed in upslope ditch from Sta. 19+600 to 20+300. <u>2011 (Site 9)</u> : Sinkhole in highway filled with gravel and the damaged culvert was replaced.	
Maintenance:	2013, 2014, 2015: Routine crack sealing, milling, and patching, as required. <u>Spring 2017</u> : ACP patching, sideslopes regraded; guardrail removed through SH12-9 <u>Fall 2017</u> : Patch over entire length of both sites Spring 2019: Milling over portions of both sites 2021: From 1.06 m (at km 19.7) up to 0 m (at km 19.79) of vertical grade readjustment (downward) and 50 mm overlay	
Observations (Site 8):	Description	Worsened?
<input checked="" type="checkbox"/> Pavement Distress	Previous longitudinal and traverse cracks continue to reflect through the pavement.	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/> Slope Movement	Site is located on an active deep-seated landslide moving toward the Peavine Creek. Previously observed scarp not visible due to grading.	<input type="checkbox"/>
<input type="checkbox"/> Erosion		<input type="checkbox"/>
<input type="checkbox"/> Seepage		<input type="checkbox"/>
<input type="checkbox"/> Bridge/Culvert		<input type="checkbox"/>

<input type="checkbox"/> Other		<input type="checkbox"/>
Observations (Site 9):	Description	Worsened?
<input checked="" type="checkbox"/> Pavement Distress	Some of the previous longitudinal and traverse cracks have reflected through. There is surface distortion over the crack pattern.	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/> Slope Movement	Site is located on an active deep-seated landslide moving toward the Peavine Creek. This site crosses over a sag pond/graben with several dips in the highway.	<input type="checkbox"/>
<input checked="" type="checkbox"/> Erosion	Small gully in backslope.	<input type="checkbox"/>
<input type="checkbox"/> Seepage		<input type="checkbox"/>
<input checked="" type="checkbox"/> Bridge/Culvert	Culvert at km 19.93: Hanging outlet condition unchanged from 2022.	<input type="checkbox"/>
<input type="checkbox"/> Other		<input type="checkbox"/>

<p>Instrumentation: None</p> <p>Assessment:</p> <p>The overall valley slope is moving as several separate slide blocks in response to the toe erosion and downcutting of two different rivers resulting in numerous scarps, sag ponds, and differential movement zones going in slightly different directions. The highway intersects the scarps of these blocks at several locations resulting in an uneven highway surface and cracking.</p> <p>Site 8: Previously observed longitudinal and traverse cracks that were paved over in 2021 were observed again in 2024. Previously observed pavement distortions are showing up but are not as significant as Site 9. Given the overall valley condition, continued creep movement is expected which may manifest as increased crack lengths, widths, depth, height differential across the cracks as well as vertical pavement distortion.</p> <p>Site 9: The crack pattern has reflected through the 2021 highway overlay. The cracks follow the previously observed major scarp crack, which roughly parallels the highway through this site and may result in further vertical distortion of the pavement surface. Given the overall valley condition, continued creep movement is expected which may manifest as increased crack lengths, widths, depth, height differential across the cracks as well as vertical pavement distortion.</p> <p>Recommendations:</p> <p>Short-Term:</p> <ul style="list-style-type: none"> ▪ ACP milling and patching should continue as necessary to maintain a safe roadway surface. Crack sealing should be done to limit the ingress of rain fall and snow melt into the crack network. <p>Medium-Term:</p> <ul style="list-style-type: none"> ▪ Culvert outlet at km 19.93 (Site 9): consideration should be given to placing some riprap at the outlet (there is none currently) to minimize downcutting through recently regraded slope. The hanging culvert situation is not sustainable. ▪ Consideration should be given to regrading the ditches at the north end of Site 9 to allow the ponded water to drain. <p>Long-Term:</p> <p>It is understood that, currently, the only long-term remediation option under consideration is realignment of the entire north hill section of Highway 744 and this study is currently being undertaken by CIMA+. Consideration is also being given to a shorter realignment which would include both of these sites as they currently require frequent maintenance.</p> <p>Ongoing Investigation:</p> <p>It is recommended that the biennial geohazard inspection should continue as scheduled.</p>
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Closure

It is a condition of this letter report that Thurber's performance of its professional services will be subject to the attached Statement of Limitations and Conditions.

Roger Skirrow, P.Eng.
Senior Geotechnical Engineer

Mark Gallego, P.Eng.
Geotechnical Engineer



STATEMENT OF LIMITATIONS AND CONDITIONS

1. STANDARD OF CARE

This Report has been prepared in accordance with generally accepted engineering or environmental consulting practices in the applicable jurisdiction. No other warranty, expressed or implied, is intended or made.

2. COMPLETE REPORT

All documents, records, data and files, whether electronic or otherwise, generated as part of this assignment are a part of the Report, which is of a summary nature and is not intended to stand alone without reference to the instructions given to Thurber by the Client, communications between Thurber and the Client, and any other reports, proposals or documents prepared by Thurber for the Client relative to the specific site described herein, all of which together constitute the Report.

IN ORDER TO PROPERLY UNDERSTAND THE SUGGESTIONS, RECOMMENDATIONS AND OPINIONS EXPRESSED HEREIN, REFERENCE MUST BE MADE TO THE WHOLE OF THE REPORT. THURBER IS NOT RESPONSIBLE FOR USE BY ANY PARTY OF PORTIONS OF THE REPORT WITHOUT REFERENCE TO THE WHOLE REPORT.

3. BASIS OF REPORT

The Report has been prepared for the specific site, development, design objectives and purposes that were described to Thurber by the Client. The applicability and reliability of any of the findings, recommendations, suggestions, or opinions expressed in the Report, subject to the limitations provided herein, are only valid to the extent that the Report expressly addresses proposed development, design objectives and purposes, and then only to the extent that there has been no material alteration to or variation from any of the said descriptions provided to Thurber, unless Thurber is specifically requested by the Client to review and revise the Report in light of such alteration or variation.

4. USE OF THE REPORT

The information and opinions expressed in the Report, or any document forming part of the Report, are for the sole benefit of the Client. NO OTHER PARTY MAY USE OR RELY UPON THE REPORT OR ANY PORTION THEREOF WITHOUT THURBER'S WRITTEN CONSENT AND SUCH USE SHALL BE ON SUCH TERMS AND CONDITIONS AS THURBER MAY EXPRESSLY APPROVE. Ownership in and copyright for the contents of the Report belong to Thurber. Any use which a third party makes of the Report, is the sole responsibility of such third party. Thurber accepts no responsibility whatsoever for damages suffered by any third party resulting from use of the Report without Thurber's express written permission.

5. INTERPRETATION OF THE REPORT

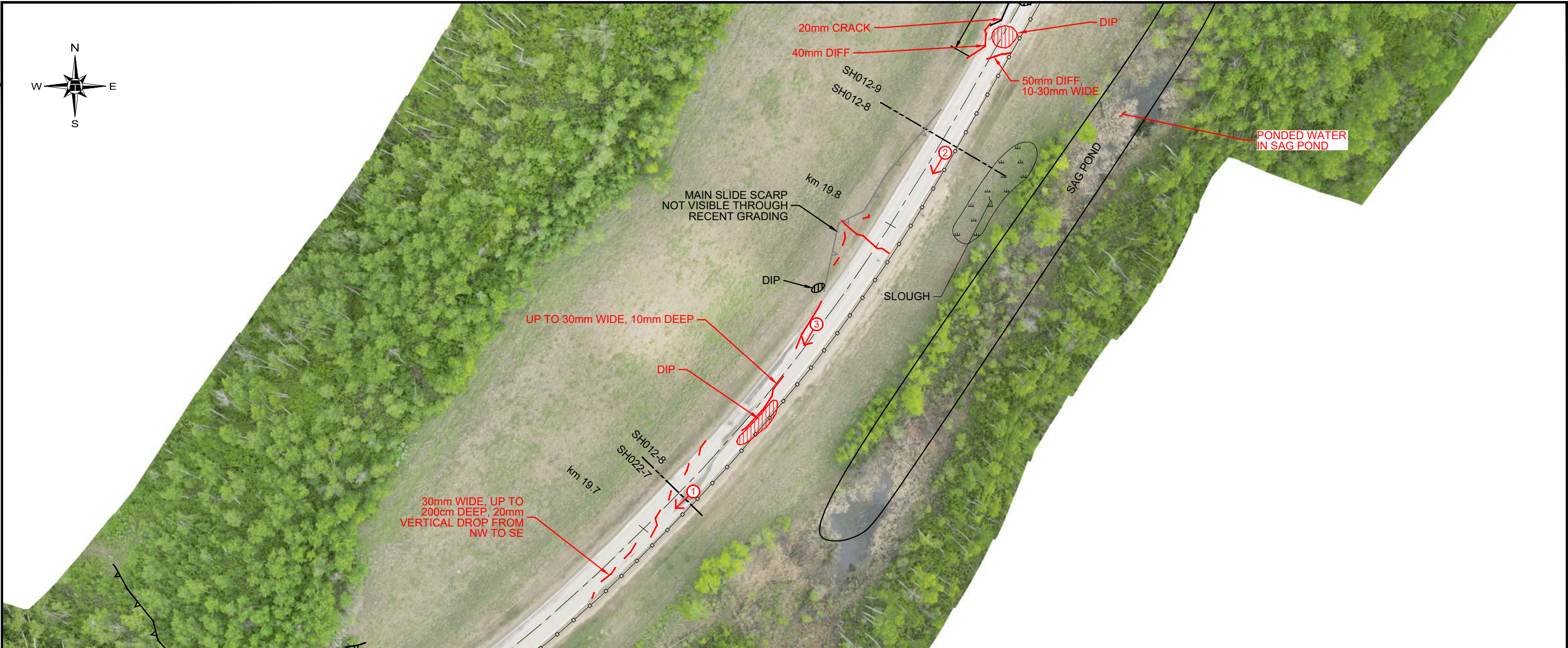
- a) Nature and Exactness of Soil and Contaminant Description: Classification and identification of soils, rocks, geological units, contaminant materials and quantities have been based on investigations performed in accordance with the standards set out in Paragraph 1. Classification and identification of these factors are judgmental in nature. Comprehensive sampling and testing programs implemented with the appropriate equipment by experienced personnel may fail to locate some conditions. All investigations utilizing the standards of Paragraph 1 will involve an inherent risk that some conditions will not be detected and all documents or records summarizing such investigations will be based on assumptions of what exists between the actual points sampled. Actual conditions may vary significantly between the points investigated and the Client and all other persons making use of such documents or records with our express written consent should be aware of this risk and the Report is delivered subject to the express condition that such risk is accepted by the Client and such other persons. Some conditions are subject to change over time and those making use of the Report should be aware of this possibility and understand that the Report only presents the conditions at the sampled points at the time of sampling. If special concerns exist, or the Client has special considerations or requirements, the Client should disclose them so that additional or special investigations may be undertaken which would not otherwise be within the scope of investigations made for the purposes of the Report.
- b) Reliance on Provided Information: The evaluation and conclusions contained in the Report have been prepared on the basis of conditions in evidence at the time of site inspections and on the basis of information provided to Thurber. Thurber has relied in good faith upon representations, information and instructions provided by the Client and others concerning the site. Accordingly, Thurber does not accept responsibility for any deficiency, misstatement or inaccuracy contained in the Report as a result of misstatements, omissions, misrepresentations, or fraudulent acts of the Client or other persons providing information relied on by Thurber. Thurber is entitled to rely on such representations, information and instructions and is not required to carry out investigations to determine the truth or accuracy of such representations, information and instructions.
- c) Design Services: The Report may form part of design and construction documents for information purposes even though it may have been issued prior to final design being completed. Thurber should be retained to review final design, project plans and related documents prior to construction to confirm that they are consistent with the intent of the Report. Any differences that may exist between the Report's recommendations and the final design detailed in the contract documents should be reported to Thurber immediately so that Thurber can address potential conflicts.
- d) Construction Services: During construction Thurber should be retained to provide field reviews. Field reviews consist of performing sufficient and timely observations of encountered conditions in order to confirm and document that the site conditions do not materially differ from those interpreted conditions considered in the preparation of the report. Adequate field reviews are necessary for Thurber to provide letters of assurance, in accordance with the requirements of many regulatory authorities.

6. RELEASE OF POLLUTANTS OR HAZARDOUS SUBSTANCES

Geotechnical engineering and environmental consulting projects often have the potential to encounter pollutants or hazardous substances and the potential to cause the escape, release or dispersal of those substances. Thurber shall have no liability to the Client under any circumstances, for the escape, release or dispersal of pollutants or hazardous substances, unless such pollutants or hazardous substances have been specifically and accurately identified to Thurber by the Client prior to the commencement of Thurber's professional services.

7. INDEPENDENT JUDGEMENTS OF CLIENT

The information, interpretations and conclusions in the Report are based on Thurber's interpretation of conditions revealed through limited investigation conducted within a defined scope of services. Thurber does not accept responsibility for independent conclusions, interpretations, interpolations and/or decisions of the Client, or others who may come into possession of the Report, or any part thereof, which may be based on information contained in the Report. This restriction of liability includes but is not limited to decisions made to develop, purchase or sell land.

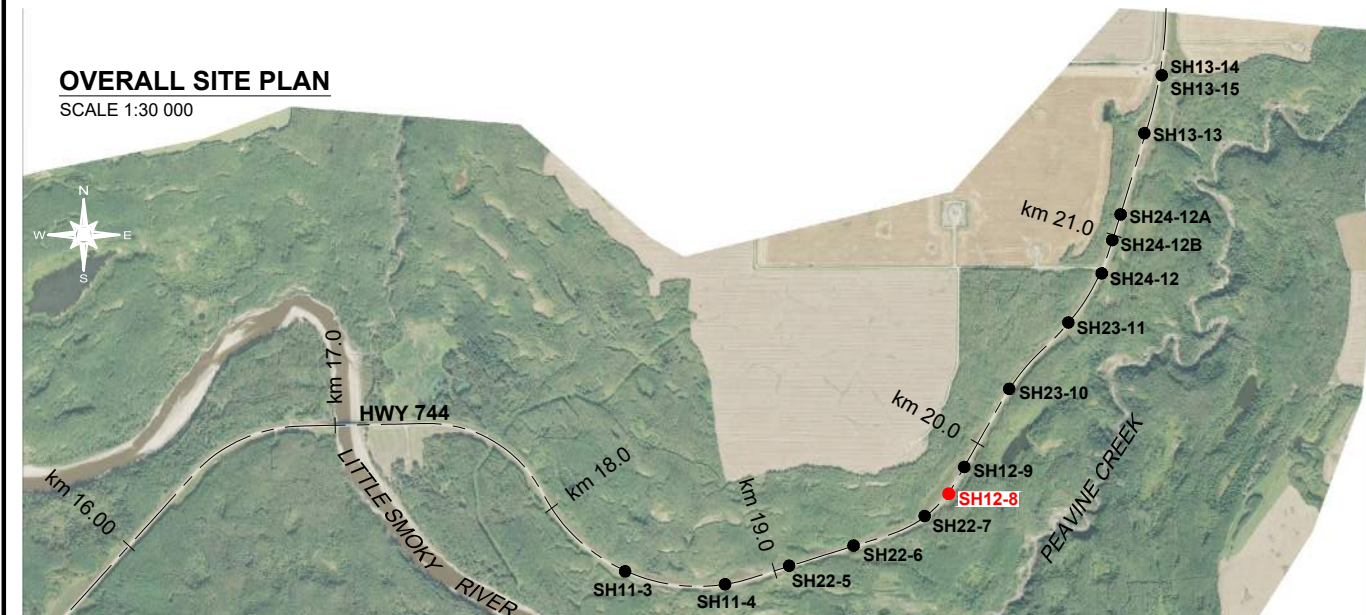


DETAILED SITE PLAN

SCALE 1:1000

OVERALL SITE PLAN

SCALE 1:30 000

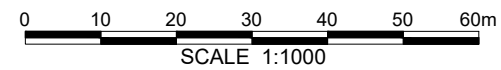


LEGEND

- GUARDRAIL
- ① → DIRECTION AND NUMBER OF PHOTO

NOTES

1. FEATURE LOCATIONS ARE APPROXIMATE.
2. JUNE 2024 OBSERVATIONS SHOWN IN RED.
3. CRACK AND PATCH PATTERNS RESET AS HWY 744 WAS OVERLAID IN SUMMER 2021.
4. GUARDRAIL AND CULVERT LOCATIONS TAKEN FROM MCINTOSH PERRY AS-BUILT DRONE SURVEY (JULY 2021).



ORTHOIMAGE DERIVED FROM UAV IMAGERY FLOWN BY THURBER IN JUNE 2024
 OVERALL SITE PLANE IMAGE: SATELLITE IMAGE FROM VALTUS IMAGERY (DATED 2014)



PEACE REGION (SWAN HILLS)

**SH012-8: HWY 744:02 LITTLE SMOKY RIVER VALLEY
 2024 SITE INSPECTION PLAN**

DWG No. 32121-SH012-8

DRAWN BY	DLA
DESIGNED BY	MG
APPROVED BY	DWP
SCALE	AS SHOWN
DATE	SEPTEMBER 2024
FILE No.	32121





Photo 1, Site 8 – Looking southwest from Site SH012-8 towards Site SH012-7.



Photo 2, Site 8 – Looking southwest from the northeast end of Site SH012-8. Previous main scarp crack not clearly visible during inspection.



Photo 3, Site 8 – Looking southwest at crack crossing from the WBL towards the centerline and EBL.



Photo 4, Site 9: Looking northeast at crack in highway surface over main slide scarp that has resurfaced.



Photo 5, Site 9: Looking northeast at cracking near northeast end of site.



Photo 6, Site 9: Looking southwest at cracks along main slide scarp.